

Running Head: DRIVE CHAIN TENSIONER

Drive Chain Tensioner

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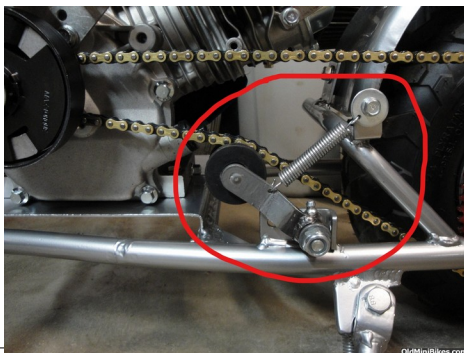
DRIVE CHAIN TENSIONER

Introduction

A drive chain tensioner is a mechanism that removes any slack of the chain with in the drive chain. Setting the optimal chain tension on a drive chain can very difficult. The smallest details like the wheel hubs not being perfectly round or wheel sprocket not centered perfectly can all create major differences in the tightness of the chain at different points. By adjusting the force the tensioner applies on the chain you can correct the tightness of the chain to ensure proper operation.

In this documentation I will explain the design and technical details that are used in the Union drive chain tensioner created by Shady Tech. Simple chain tensioners (I like to call them passive) wont solve this issue as they don't adjust with the chains needs. You set them at a certain tension position and they hold that tension irregardless of the forces on it from the chain. These are used mainly where the chain has a uniform slack so all points will have the same amount of force applied to them. The way to solve my issue is to install a spring-loaded chain tensioner (I like to call them active). Three versions are shown in figures (1), (2) and (3).

Figure (1): extension spring creates loads when stretched. Figure (2): torsion spring, very compact



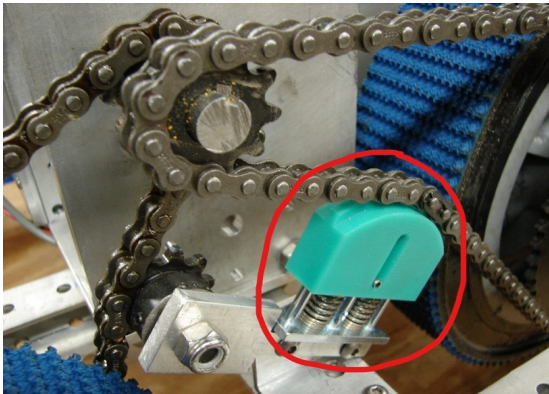
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Figure (3) Linear tensioner shown: uses compression springs to apply a force.



bjmster1. "Team 1029 Idlers and Tensioners Oooo Aaaaaa." *Chief Delphi RSS*, 2 Feb. 2007,
www.chiefdelphi.com/media/photos/26673.

The issue is, they all have to large of a form factor to be usable for my project.

Figure (4): motor mount.



Figure (5): space between motor mount and tire.



As you can see the amount of space there is to
mount a tensioner is very limited.

Take note of the slack of the chain in the images.

When ever I refer to the **motor mount** (later in the
documentation) I am referring to the black piece of

metal you see in the image.

Figure (6): Front view.



Figure (7): Rear view



With all this in mind Shady Tech created a
compact active tensioner called the Union. It
contains the enclosure, roller assembly, and
spring.

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Major Parts

Enclosure

The enclosure is the structural back bone to the tensioner. It has sufficient thickness to ensure there will be no cracking while under use and stress. The enclosure contains an oval slot and mounting holes, back cut-out, and basic design and shape. Its overall dimensions are 45mm X 18mm X 11mm.

Figure (8): CAD Drawing: enclosure front

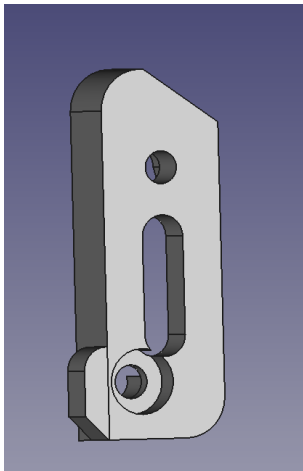
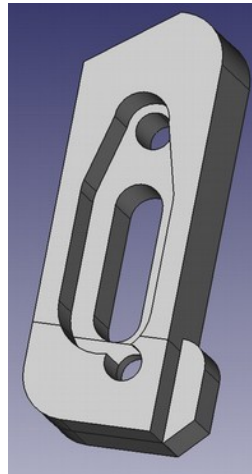


Figure (9): CAD Drawing: enclosure back



oval slot.

This slot allows the adjusting mechanism to move up and down dynamically adjusting the chains tensions according to its needs.

mounting holes.

Two holes were made to allow the tensioner to have a strong fix on the motor mount. This is important to stop any rotation that would happen by force and vibrations. The size of these holes are 5mm and where countersunk to allow for more clearance between the tensioner and the wheel.

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back cut- out.

This is where the spring attaches to the enclosure and roller and apply its force on the roller. It was designed as a cut-out to enclose the mechanism with-in the enclosure to allow for a more compact design.

design/shape.

Besides for its functionality Shady Tech wanted to create an aesthetically pleasing design. We curves and shapes where designed to blend in with the motor mount to create a streamline design.

Roller assembly

The roller assembly makes direct contact with the chain. Although it can be a smooth stationary part, a roller was used to spin with the chain to reduce friction which reduces strain on both the chain and the actual roller.

Figure (10): roller



Figure (11): bushing



Figure (12): bolt

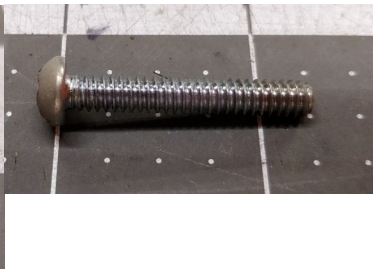
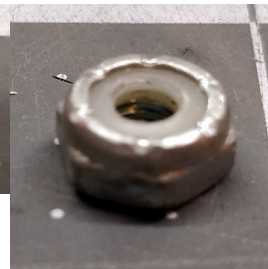


Figure (13): nut



by: razor e100 scooter

roller.

A 20mm outer diameter X 11mm inner diameter X16mm width round black wheel that is wide enough for the chain to rest on. The only physical part that touches the chain. It spins on a bushing to reduce wear.

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bushing.

A cylindrical 10mm length X 11mm diameter piece of metal that has a smooth outer and inner surface. It is used as an insert for the roller to spin on. It itself spins on the bolt used to secure it to the enclosure.

bolt.

A 6X32 pitch screw that is 1inch long used to secure the bushing to the enclosure.

nut.

6X32 nylon locking nut is used to secure the end of the screw. It has dimensions of 10mm diameter and 6mm height. A nylon nut in specific is used to make sure that the nut does not loosen due to vibrations.

Spring

A 16mm length X 5mm diameter extension spring is used. This is used as the main force producer. It creates an upwards force on the chain. It has two main loops on its ends. One end is secured to the top enclosure mounting bolt and the other side is connected to the roller assembly bolt.

Figure (14): extension spring



Conclusion

To solve the issue that all tensioners on the market have to large of a form factor to fit in tighter spots the Union tensioner was created to solve this issue. The Union tensioner has excellent form factor; fits nicely in between wheel and motor mount. Combines all the best factors of the existing

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tensioners on the market. In the future revisions we will re-print it in black to blend it in with the motor mount. More durable material will be used as in the hot summer days PLA can start to soften easier, plus PLA isn't the most durable material. Nylon is an obvious choice however ABS or PETG should be strong enough.

Figure (15): front view

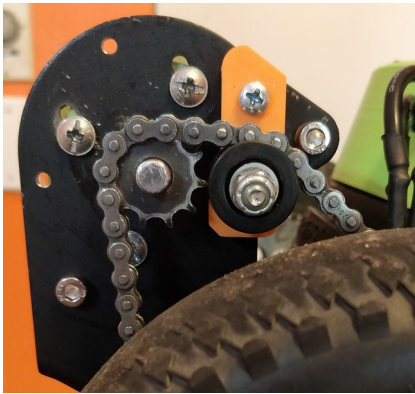
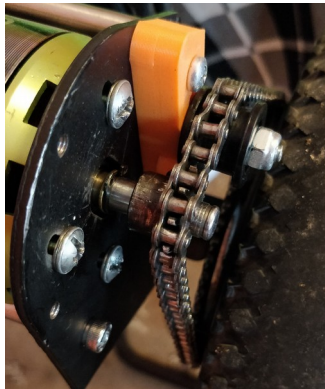


Figure (16): side/gap view



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Work Cited:

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